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IS 7974-2 (1977): Graphical symbol for use on detailed maps, plans and geological cross sections, Part 2: Representation of sedimentary rocks [MED 8: Mining Techniques and Equipment]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

GRAPHICAL SYMBOLS FOR USE ON DETAILED MAPS,
PLANS AND GEOLOGICAL CROSS SECTIONS

PART II REPRESENTATION OF SEDIMENTARY ROCKS

1. Scope — Lays down symbols and ornaments for the representation of sedimentary rocks on detailed maps, plans and geological cross sections.

2. Groups

- a) Principal types, and
- b) Varia.

2.1 Symbols of two groups derived from a logical system are reproduced in Tables 1 and 2 which may be completed easily in case of need.

3. Principal Types

3.1 Classification (See Table 1) — In Table 1, the sedimentary rocks of 18 principal types (18 rows numbered 1 to 18) have been classified into 15 groups (15 columns numbered 1 to 15) according to nature of rocks specifying, by means of an adjective, the petrographic property of the rocks (box 3/12, for example, represents an area as sandy limestone)*. At the top of Table 1 the individual symbols are given, several of which, when juxtaposed, form the ornaments of the corresponding rocks. The constituents of rocks are given from left to right: first the clastic constituents (from detritus to clay), followed by the chemical and organic sediments. For the basic types the same order is observed for the horizontal subdivision of Table 1.

3.1.1 The individual symbols shown have been used to form the ornaments with an irregular arrangement to characterize loose rocks, and a systematic staggered arrangement to represent consolidated rocks.

3.1.2 The column, 'Basic types', comprises rocks with no supplementary characterization, and pure types. 'Mixed types', on the other hand, are rocks whose composition is characterized by their petrographic peculiarities, for example, by a binder such as argillaceous sandstone, box 5/8, or by additional constituents such as gritty sand, box 2/3. The boxes at the intersection of a basic type (horizontal row) and of the same character (vertical column) are emphasized by a diagonal.

3.2 Individual Symbols — As far as possible, the selected ornaments shall express in a diagrammatic way the nature of the rocks. This is relatively easy to accomplish in the case of elastic sedimentary rocks.

3.2.1 Detritus — This shall be represented by sharp-cornered particles, rounded gravel shall be represented by round particles. The smaller grain of sand shall be marked on the drawing by a dot. A detailed subdivision according to the size of the grains, for example, division into coarse, medium or fine sand, may be obtained by the smaller or the larger dimension of the symbols as shown in Fig. 1 to 4.

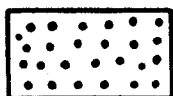


FIG. 1 COARSE SAND

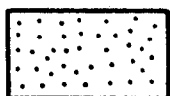


FIG. 2 MEDIUM SAND

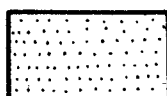


FIG. 3 FINE SAND

FIG. 4 SAND WITH
GRAINS OF DIFFERENT SIZES

3.2.2 Silt — To represent silt, a symbol consisting of two dots (the symbol of sand) and a line (the symbol of clay) shall be used corresponding to the dimensions of its constituent particles which have an intermediary place between sand and clay. It shall, however, be noted that the dots shall touch the line.

3.2.3 Clay and clay rocks — A horizontal ornament has been chosen, in order to illustrate the

*In order to designate a box, the number of the column shall be used first, and then the number of row, the two numbers being separated by a stroke, for example, 3/12.

imperviousness of these rocks. In the ornament for shale which is characterized by the highest degree of consolidation, the lines shall be elongated so that they form continuous lines.

3.2.4 Limestone — The ornament retained is already widely used and has the form of a trellised framework. It represents a stratified limestone with its fissures.

3.2.5 Dolomite — In this ornament, where calcium is partially replaced by magnesium, the vertical lines shall slope slightly towards the right, forming an angle of 60° with the horizontal. The same oblique line can be found again in the ornaments for potassium-magnesium salts. The elementary symbols for the two carbonates make use of the characteristic part of the corresponding ornaments.

3.2.6 Gypsum — Gypsum shall be represented by a simplified reproduction of its typical twin crystal known under the name 'fer de lance'*. The angle shall be 90° in order to give a more elongated form to the symbol.

3.2.7 Anhydrite — The same symbol as in 3.2.6, but reversed, shall be used to represent anhydrite. Being similar to the letter 'A' (anhydrite), it is relatively easy to remember.

3.2.8 Sodium salt — This shall be represented by a square, derived from the cubic shape of its crystal. In order to distinguish sodium salt from potassium-magnesium salt, a diagonal line shall be traced in the square, descending from left to right in the case of a magnesium salt (by analogy with the symbol for dolomite).

3.2.9 'Ferruginous' and 'Siliceous' symbols — The forms finally retained have been adopted because no better ones were available which could represent the property of those rocks to full satisfaction.

3.2.10 Carbonaceous nature — This shall be represented by a black band resembling the cross section of a seam of coal.

3.2.11 Peat — This shall be represented by two black rectangles placed slightly out of alignment, recalling the manner of superimposing layers of peat to dry them in air. The black triangle shall be used to signify 'bituminous' and is already widely used.

3.2.12 Mineable deposits of any nature — These shall be represented by black or by a very densely cross-hatched portion. This representation shall be used primarily for mineable deposits such as coal (hard coal or lignite), bauxite, iron ores, phosphates, sulphur and manganese ores.

3.2.12.1 When a mineable deposit is constituted by a rock for which an ornament has already been provided in Table 1, for example, rock-salt and gypsum, this may be represented either by black or by a densely hatched portion or even by the corresponding ornament. Where the black colour or the hatched portion will cover too large a surface on the map, preference shall be given to the ornament.

3.2.12.2 In order to characterize particular properties of mineable deposits corresponding symbols shall be included in white areas on the black background (see Fig. 5 and 6).



FIG. 5 SANDY COAL



FIG. 6 PHOSPHORITIC IRON ORE

3.2.12.3 Where a deposit is represented by black or by a densely hatched portion, the nature of the rock shall be indicated in a key.

3.2.13 Mixed rocks — Mixed rocks shall be represented by combinations of ornaments of the basic types and of the individual symbols. Obviously, it is possible to include in a basic ornament several accessory individual symbols in order to give a more detailed representation of a rock. In Table 1 this representation of a more detailed nature has been abandoned with a view to obtain greater clarity.

3.2.13.1 The series of mixed types appearing in Table 1 is far from being exhaustive.

3.2.14 Combination limestone/clay — Table 1 includes only two ornaments, namely, that for argillaceous limestone (box 5/12) and that for calcareous clay (box 6/10). In more or less equal proportions these two constituent elements make up marlstone which, because of the frequency of its occurrence, has been mentioned in Table 2. The ornaments given in Fig. 7 to 15 show the large range of possibilities of a more detailed subdivision if this is found to be necessary.

*This designation means 'spear-head'.

TABLE 1 SYMBOLS FOR PRINCIPAL TYPES

(Clauses 2.1, 3.1, 3.2.12.1, 3.2.13.1, 3.2.14 and 4)

NATURE OF ROCK	DETRITUS	GRITTY PEBBLY	SANDY	SILTY	ARGILLA-CEOUS	CALCAREOUS	DOLOMITIC	GYPSI-FEROUS	ANHYDRITE	SODIUM SALT	POTASSIUM-MAGNESIUM SALTS	FERRU-GINOUS	SILICEOUS	CARBONA-CEOUS	BITUMINOUS
INDIVIDUAL SYMBOLS															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BASIC TYPES		MIXED TYPES (SEE ALSO TABLE 2-VARIA)													
1 DETRITUS															
2 GRAVEL															
3 SAND															
4 SILT															
5 CLAY															
6 BRECCIA															
7 CONGLOMERATE															
8 SANDSTONE															
9 SILTSTONE															
10 MUDESTONE															
11 SHALE															
12 LIMESTONE															
13 DOLOMITE															
14 GYPSUM															
15 ANHYDRITE															
16 SODIUM SALT															
17 SILICEOUS ROCKS															
18 PEAT															

MINE ABLE
DEPOSITS

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TABLE 2 SYMBOLS FOR VARIA
(Clauses 2.1, 3.2.14, 4, 4.1, 4.2 and 4.2.3)

ROCKS					
101	GREYWACKE		102	ARKOSE	
103	QUARTZITE		104	VARVED CLAY	
105	MARLSTONE		106	REEF LIMESTONE	
107	CHALK		108	CALCAREOUS TUFF	
109	POTASSIUM MAGNESIUM SALT		110	KIESELGUHR	
111	LOESS		112	LOAM	
113	BOULDER CLAY		114	TILLITE	
115	LATERITE		116	BLEACHED SOIL	
117	THIN KEY BEDS		OR AT CHOICE		
118			119		120
MINERALS					
201	FELDSPAR		202	MICA	
203	GLAUCONITE		204	PYRITE	
205	PHOSPHORITE		206		
OTHERS					
301	CONCRETION		302	OOOLITE	
303	INCRUSTATIONS, FOR EXAMPLE FERRUGINOUS		304	CAVERN FOR EXAMPLE IN LIMESTONE	
305	VOLCANOGENETIC ADMIXTURES		306	HUMOUS	
307	STIGMARION BED		308	FOSSILIFEROUS (IN GENERAL)	
309	VERTEBRATES		310	INVERTEBRATES (MARINE)	
311	INVERTEBRATES (NON-MARINE)		312	MICROFAUNA	
313	FLORA		314	MICROFLORA	
315	SHELLY LAYER		316		
317			318		

Note—This table may be completed according to particular need.



FIG. 7 LIMESTONE

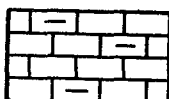
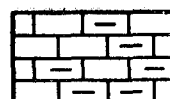
FIG. 8 ARGILLACEOUS LIMESTONE
(See Box 5/12)

FIG. 9 MARLY LIMESTONE

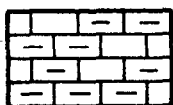


FIG. 10 CALCAREOUS MARL

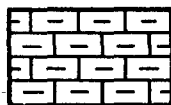
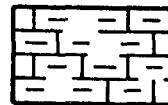
FIG. 11 MARL
(See Table 2, Symbol No. 105)

FIG. 12 CLAYEY MARL

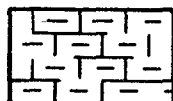


FIG. 13 MARL MUDSTONE

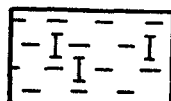
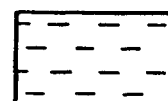
FIG. 14 CALCAREOUS MUDSTONE
(See Box 6/10)

FIG. 15 MUDSTONE

4. Varia — The symbols for varia (see Table 2) are complementary to symbols for 'Principal types' (see Table 1). It comprises not only symbols and ornaments for sedimentary rocks which are relatively rare or which are hardly suitable for classification used in the case of principal types, but also symbols for the inclusions found in sedimentary rocks (minerals, etc).

4.1 Groups of Varia — Table 2 has been subdivided into the three different groups containing:

- ornaments and symbols for rocks,
- symbols for minerals, and
- ornaments and symbols for other important features concerning sedimentary rocks.

4.2 Ornaments and Symbols for Rocks — This group contains symbols and ornaments of rocks for which the classification of the principal types is not very suitable such as represented by Symbols 101 to 117 of Table 2.

4.2.1 Greywacke (symbol 101) — Figures 16, 17 and 18 show a combination of symbols of the essential constituents of this type of rock, that is, sandstone (the principal constituent of greywacke), rock fragments (for example, volcanic rocks) and feldspar.

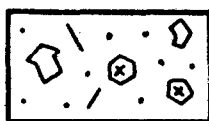


FIG. 16 GREYWACKE



FIG. 17 GREYWACKE

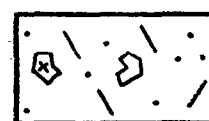


FIG. 18 GREYWACKE

4.2.2 Loess (symbol 111) — Since the size of the particles of loess is almost equal to the size of the particles of silt, the same elementary symbol (see 3.2.2) shall be used for loess; the lines, however, shall be arranged vertically and the dots added irregularly either on the right or on the left of each line. The vertical arrangement of the lines is a reminder of the straight walls which are characteristic of loess.

4.2.3 Boulder clay (symbol 113) — When it is necessary to distinguish between boulder clay and boulder marlstone, the oblique line shown in Symbol 113 of Table 2, which represents the clay-like character, shall be replaced by a relatively short vertical line, which indicates the lime content of marlstone (see Fig. 19).

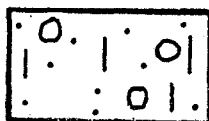


FIG. 19 BOULDER MARLSTONE

4.3 Symbols for Minerals — This group, contains the symbols of certain minerals which may serve for a more precise characterization of sedimentary rocks (see Fig. 20).

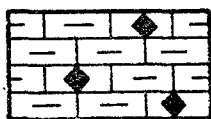


FIG. 20 MARL WITH PYRITE INCLUSIONS

4.3.1 Feldspar (symbol 201) — The symbol represents several long crystals of feldspar included in a sedimentary rock.

4.3.2 Mica (symbol 202) — The symbol confers the impression of a few flakes of mica.

4.3.3 Glauconite (symbol 203) — The combination of three circles in contact filled in with black has been selected to show the botryoidal structure of glauconite.

4.4 Others — This group shall include symbols and ornaments which represent various particularities, such as inclusions, fossils, etc.

4.4.1 Concretion (symbol 301) — The contour of the symbol shall show a borrowing in order to avoid confusion with other shapes, for example, with a cavern.

4.4.1.1 In the symbol the elementary symbols of the substance forming the concretion shall be inscribed.

4.4.2 Incrustations (symbol 303) — The symbols for the materials forming the incrustation shall be placed under small arcs (see Fig. 21 and 22).



FIG. 21 CROSS-SECTIONAL REPRESENTATION

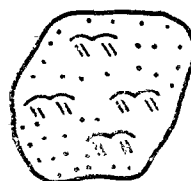


FIG. 22 PLAN REPRESENTATION

4.4.3 Cavern (symbol 304) — In the ornament of the relevant sedimentary rock a white area shall be left, the outline of which shall correspond as far as possible to the shape of the cavern. In the case of caverns which have the shape of a slit, the lines of the contour shall be very irregular in order to distinguish them from tectonic fissures, which are represented by straight line contours (see Fig. 23).



FIG. 23 CAVERN IN LIMESTONE

4.4.3.1 This ornament is distinguished from cave limestone by the fact that the small caverns in the latter interrupt the vertical lines of the limestone symbol (see Fig. 24).

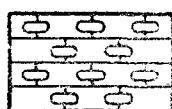


FIG. 24 CAVE LIMESTONE

4.4.3.2 In the case of a calcareous breccia, the elementary symbols of the rocks of which it is made up shall be inscribed in the ornament for the breccia (see Fig. 25).



FIG. 25 CALCAREOUS BRECCIA WITH BLOCKS OF DOLOMITE AND QUARTZITE

4.4.3.3 Concretions in limestones are characterized by their clearly defined outlines and by their position between the vertical lines of the limestone (see Fig. 26).

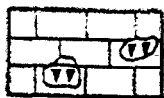


FIG. 26 LIMESTONE WITH SILICEOUS CONCRETIONS

4.4.4 *Volcanogenetic admixtures (symbol No. 305)* — The basic symbol for volcanogenetic rocks (V) shall be arranged horizontally in order to give the impression of sedimentation.

EXPLANATORY NOTE

This standard is in conformity with ISO 710/II-1974 'Graphical symbols for use on detailed maps, plans and geological cross sections, Part III Representation of sedimentary rocks' issued by the International Organization for Standardization.